

REMARKS

Claims 1-38 are pending, with claim 38 withdrawn from consideration. Claims 1, 9, 12-14, 16, 21, 22, 24-26, 27-30, and 33 are amended. Claims 5-8, 10, 11, and 15, 20, 24, 31, and 34 are canceled. New claims 39-44 are presented. Applicants reserve the right to pursue previously pending subject matter in this or a continuing application.

Claims 1,2, 6, 12, 15, 27, 33, and 34 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,635,358 to Wilding et al. ("Wilding").

As amended herein, independent claim 1 recites a microfluidic device for processing a cell-containing microdroplet, comprising:

- a lysing zone,
- a thermopneumatic actuator to create a difference between an upstream pressure and a downstream pressure acting on the cell-containing microdroplet to move the microdroplet at least partially into the lysing zone,
- a vent located upstream of the lysing zone and configured to reduce the pressure difference to stop the cell-containing microdroplet in a lysing position with respect to the lysing zone,
- and a lysing mechanism to release intracellular material from cells within the cell-containing microdroplet stopped within the lysing zone.

Wilding does not disclose or suggest a microfluidic device having a vent as recited in claim 1. For at least this reason, the rejection of independent claim 1 and its dependent claims as anticipated by Wilding has been overcome.

Independent claim 27, as amended herein, recites a microfluidic method for processing a cell-containing liquid microdroplet, comprising:

- propelling a microdroplet toward a lysing mechanism by creating a pressure difference between upstream and downstream portions of the microdroplet, venting gas from upstream of the microdroplet to reduce the pressure difference and stop the cell-containing microdroplet in a lysing position with respect to a lysing mechanism of a microfluidic device; and actuating a lysing mechanism to release intracellular material from cells of the stopped cell-containing microdroplet.

Wilding does not disclose or suggest venting gas as recited in claim 27. For at least this reason, the rejection of independent claim 27 as anticipated has been overcome.

Claim 33 recites a microfluidic method for processing a cell-containing liquid, comprising:

- introducing the cell-containing liquid to a lysing zone of a microfluidic device;
- inhibiting fluid of the cell-containing liquid from exiting the lysing zone, then actuating the lysing mechanism to release intracellular contents from cells of the cell-containing liquid within the lysing zone;
- and then providing a gas pressure sufficient to prepare a microdroplet comprising intracellular contents released from cells of the cell-containing liquid within the lysing zone.

Wilding discloses a cell lysis chamber 22, which is understood to operate via fluid flow, e.g., through piercing protrusions 24. Wilding, 6:30-49. Wilding is not understood to disclose inhibiting fluid from exiting the lysing chamber and then actuating a lysing mechanism as recited in claim 33.

For at least this reason, the rejection of claim 33 as anticipated has been overcome.

Claims 3-5, 32, 35 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding in view of U.S. Pat. No. 6,534,295 to Tai et al. ("Tai").

Claims 3-5 depend from claim 1. No combination of Wilding and Tai discloses or suggests the microfluidic device of claim 1 having a vent as recited in claim 1.

Claims 32, 35, and 36 depend from claim 33, which recites inhibiting fluid from exiting the lysing chamber and then actuating a lysing mechanism. Applicants submit that the cited references provide no motivation to modify Wilding to inhibit fluid from exiting the lysing chamber and then actuating a lysing mechanism as recited in claim 33 at least because the cell lysing means of Wilding are understood to operate on a flowing sample, not a stopped microdroplet. Wilding, 6:30-49.

Claims 7-11, 28 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding in view of U.S. Pat. No. 6,572,830 to Burdon et al. ("Burdon").

As discussed above, independent claim 1, from which claims 7-11 depend, refers to a

vent. Burdon is not understood to disclose or suggest a microfluidic device having a vent as recited in claim 1. Accordingly, the rejection of claims 7-11 as unpatentable over Wilding in view of Burdon has been overcome.

Independent claim 27, from which claims 28 and 29 depend, recites venting gas from upstream or downstream of the microdroplet to reduce a pressure difference. No combination of Wilding and Burdon discloses or suggests the invention of claim 27. Accordingly, the rejection of claims 28 and 29 has been overcome.

Claims 13 and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding in view of U.S. Pat. No. 6,326,211 to Anderson ("Anderson").

Claims 13 and 14 depend from claim 1. No combination of Wilding and Anderson discloses a vent located upstream of a lysing zone and configured to reduce the pressure difference to stop a cell-containing microdroplet in a lysing position with respect to the lysing zone, as recited in claim 1. Moreover, Applicants submit there is no motivation to modify Wilding to include such a vent at least because the cell lysing means of Wilding are understood to operate on a flowing sample, not a stopped microdroplet. Wilding, 6:30-49.

Claims 16, 17, 20-22, 24, and 37 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding in view of U.S. Pat. No. 5,726,404 to Brody ("Brody").

Independent claim 16, as amended herein, recites a microfluidic device for processing a cell-containing fluid, comprising:

- a lysing zone;
- a lysing mechanism to release intracellular contents from cells within the lysing zone;
- a gas actuator configured to move an amount of a cell-containing fluid downstream at least partially into the lysing zone;
- a positioning element located downstream of the lysing zone and configured to inhibit downstream movement of the cell containing fluid, thereby positioning at least some of the cell containing fluid in a lysing position with respect to the lysing zone;
- and
- a thermopneumatic gas actuator disposed upstream from the positioning element to provide a gas pressure sufficient to (a) prepare a microdroplet comprising intracellular contents released

from cells of the cell-containing fluid within the lysing zone, the microdroplet having a length substantially equal to a distance between the gas actuator and the positioning element and (b) move the microdroplet downstream of the lysing zone and past the positioning element.

No combination of Wilding and Brody discloses a microfluidic device including a lysing zone and a positioning element configured to inhibit downstream movement of the cell containing fluid, thereby positioning at least some of the cell containing fluid in a lysing position with respect to the lysing zone, as recited in claim 16. Moreover, there is no motivation to modify Wilding to include such a positioning element at least because the cell lysing means of Wilding are understood to operate on a flowing sample, not a stopped microdroplet. Wilding, 6:30-49.

In view of the foregoing, the rejection of claims 16, 17, 20-22, 24, and 37 has been overcome.

Claims 18 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding and Brody and further in view Tai.

No combination of Wilding, Brody, and Tai discloses a microfluidic device including a lysing zone, a positioning element, and a thermopneumatic gas actuator configured to prepare a microdroplet, as recited in claim 16.

Applicants submit that the rejection of claims 18 and 19, which depend from claim 16, has been overcome.

Claim 25 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding and Brody and in further view of Burdon.

No combination of Wilding, Brody, and Burdon discloses a microfluidic device including a lysing zone, a positioning element, and a thermopneumatic gas actuator configured to prepare a microdroplet, as recited in claim 16.

Accordingly, the rejection of claim 25, which depends from claim 16, has been overcome.

Claim 26 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding and Brody and in further view of Anderson.

No combination of Wilding, Brody, and Anderson discloses a microfluidic device including a lysing zone, a positioning element, and a thermopneumatic gas actuator configured to prepare a microdroplet, as recited in claim 16.

Accordingly, the rejection of claim 26, which depends from claim 16, has been overcome.

Claim 23 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilding and Brody and in further view of Anderson.

No combination of Wilding, Brody, and Anderson discloses a microfluidic device including a lysing zone, a positioning element, and a thermopneumatic gas actuator configured to prepare a microdroplet, as recited in claim 16.

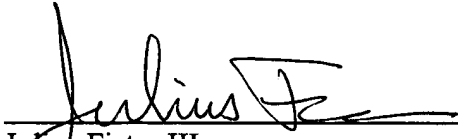
Accordingly, the rejection of claim 23, which depends from claim 16, has been overcome.

Enclosed is an \$88.00 check for excess claim fees and a \$215.00 check for the Petition for Extension of Time fee.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

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